

**REMARKS**

*Claim Amendments*

Applicants respectfully request entry of the above claim amendments, which cancel Claims 63-67, amend Claims 1, 6, 7, 18, 24, 45, 52 and 71, and add new Claims 91-104. Support for the amendments is found at Page 2, line 30 through Page 3, line 4 of the PCT Application as published, among other places. Support for new Claims 91-104 is found at Page 19, line 28 through Page 20, line 7; Page 13, line 3 through Page 14, line 14; and Page 22, line 10 through Page 23, line 20 of the PCT Application as published, among other places.

*Trademark Term in Claims*

Regarding the use of the trademark Nafion® in Claims 63 and 67, those claims are canceled herewith.

*Rejections under 35 U.S.C. §103(a)*

Claims 1-4 and 6-17 were rejected under 35 U.S.C. §103(a) as obvious over U.S. Patent No. 5,348,691 of McElroy *et al.* (here “McElroy *et al.* ‘691”) in view of International Patent Application WO 00/44479 (here “Cheng *et al.* ‘479”) and U.S. Patent No. 6,842,998 of Kashkoush *et al.* (here “Kashkoush *et al.* ‘998”). Claims 18, 24, 44-50, 52-67 and 68-90 were rejected as obvious over various combinations of U.S. Patent No. 4,704,348 of Koizumi *et al.* (here “Koizumi *et al.* ‘348”) in view of McElroy *et al.* ‘691, Cheng *et al.* ‘479 and Kashkoush *et al.* ‘998.

Applicants respectfully traverse these rejections and submit that none of independent Claims 1, 7, 18, 24 and 44-47 is disclosed or suggested by any of McElroy *et al.* ‘691, Cheng *et al.* ‘479, Kashkoush *et al.* ‘998 or Koizumi *et al.* ‘348, separately or in combination, because those references do not disclose or suggest use of a hollow fiber membrane moisturizer to create a humidified purge gas mixture that is supplied to at least part of a lithographic projection apparatus, and similar features recited in the present independent apparatus and method Claims 1, 7, 18, 24 and 44-47.

In particular, McElroy *et al.* '691 does not disclose or suggest such a feature of independent claims 1, 7, 18, 24 and 44-47 because McElroy *et al.* '691 is devoid of any disclosure or suggestion of using a hollow fiber membrane contactor to moisturize a purge gas for a lithographic projection apparatus. Instead, McElroy *et al.* '691 relates to humidifying devices that are used in aircraft environmental systems and in commercial and home ventilation systems (see Col. 1, lines 7-9 of McElroy *et al.* '691). Because the focus of McElroy *et al.* '691 is on providing bacteria-free air for aircraft crew (see Col. 1, lines 27-41), the reference provides no disclosure or suggestion of using the system of McElroy *et al.* '691 to humidify a purge gas of a lithographic projection apparatus.

Further, Cheng *et al.* '479 does not disclose or suggest independent claims 1, 7, 18, 24 and 44-47 because one of ordinary skill in the art would have been taught away from the claimed hollow fiber membrane contactor configured to add moisture to a purge gas by the contents of Cheng *et al.* '479 itself. Cheng *et al.* '479 describes applications of liquid-gas contactors for gas absorption and gas stripping.

In such conventional applications of liquid-gas contactors, gas absorption from a gas stream was accomplished by dispersing the gas as bubbles in packed towers and plate columns in a counter-current flow to the liquid stream. The goal of the liquid-gas contactor was to add the gas into a liquid.

The other conventional use of a liquid-gas contactor discussed in Cheng *et al.* '479 involved gas stripping, in which a gas dissolved in a liquid was transferred out of the liquid into a gas stream.

Cheng *et al.* '479 discusses the use of membrane contactors to perform these two functions of conventional liquid-gas contactors, *i.e.*, gas absorption and gas stripping. (See Page 2, lines 4-15 of Cheng *et al.* '479). Gas transfer occurred across the pores of a membrane contactor, either to add or to remove gas from a liquid. For example, oxygen was removed from ultra-pure water.

However, Cheng *et al.* '479 does not disclose or suggest a hollow fiber membrane moisturizer that is “configured to add moisture to a purge gas,” as recited by each of independent claims 1, 7, 18, 24 and 44-47, *i.e.*, a membrane configured to add liquid to a gas, which is the reverse of the Cheng *et al.* '479 process.

Page 3, lines 12-16 of Cheng *et al.* '479, for example, discuss application of a polymeric membrane for use with organic solvent-based solutions for wafer coating in the microelectronics industry, and for high-temperature stripping baths in the same industry. At Page 5, lines 1-4 of Cheng *et al.* '479, typical applications for a membrane contactor are described as removing dissolved gases from liquids ("degassing") or adding a gaseous substance to a liquid, such as adding ozone to very pure water to wash semiconductor wafers. At Page 6, lines 12-18 of Cheng *et al.* '479, the addition of ozone to drinking water is discussed; and at Page 6, line 19 through Page 7, line 3 of Cheng *et al.* '479, there is discussed the cleaning of organic impurities from silicon wafers at room temperature with ozone-injected ultrapure water.

However, these applications of hollow fiber membrane contactors discussed in Cheng *et al.* '479 would have led one of ordinary skill in the art to consider that such membrane contactors could be used for gas absorption from a liquid, gas stripping from a liquid, adding a gas to a liquid, or performing a chemical reaction. All of those applications are focused on the liquid, either to add or remove gas from it.

By focusing on degassing or adding gas to a liquid, none of these applications discussed in Cheng *et al.* '479 disclose or suggest the humidification of a gas by adding a liquid such as water to the gas across a hollow fiber membrane contactor. Cheng *et al.* '479 therefore would have taught away from the creative idea of a hollow fiber membrane moisturizer that is "configured to add moisture to a purge gas," as recited by each of independent claims 1, 7, 18, 24 and 44-47.

Applicants therefore submit that Cheng *et al.* '479 does not disclose or suggest the recited features of independent claims 1, 7, 18, 24 and 44-47.

Further, Kashkoush *et al.* '998 does not disclose or suggest use of a hollow fiber membrane moisturizer to create a humidified purge gas mixture that is supplied to at least part of a lithographic projection apparatus, because Kashkoush *et al.* '998 instead relates to a membrane dryer that supplies a mixture of isopropyl alcohol and nitrogen to a process chamber in order to dry a semiconductor wafer (see Col. 1, lines 26-38 of Kashkoush *et al.* '998), and therefore relates to the process of drying semiconductor wafers rather than to the entirely different process of lithographic projection. Furthermore, Kashkoush *et al.* '998 actually teaches away from the present technique of humidifying a purge gas that is supplied to a lithographic projection

apparatus because supplying a drying mixture such as that of Kashkoush *et al.* '998 to a lithographic projection apparatus would achieve the opposite of the desired humidifying effect of the present independent Claims 1, 7, 18, 24 and 44-47. As discussed at Page 1, line 24 through Page 2, line 6 of the present PCT Application as published, a lack of moisture in a lithographic projection apparatus results in improper development of the photoresist and undesirable changes in the refractive index of interferometric instruments. The semiconductor wafer drying device of Kashkoush *et al.* '998 therefore provides no disclosure or suggestion of supplying a humidified purge gas to a lithographic projection apparatus and, by providing a drying device, actually teaches away from such a technique of present independent claims 1, 7, 18, 24 and 44-47.

Regarding the rejection of independent Claims 18, 24 and 44-47, Koizumi *et al.* '348 does not disclose or suggest the features recited in those independent claims because Koizumi *et al.* '348 relates to an entirely different type of humidifier than the hollow fiber membrane moisturizer of the present independent Claims 18, 24 and 44-47. In particular, Koizumi *et al.* '348 relates to a humidifier 16 (see Fig. 3 of Koizumi *et al.* '348) in which a layer of porous glass 24 separates nitrogen gas from de-ionized water 27, such that gas inlet through inlet pipe 25 bubbles through the water 27 to produce a humidified stream that is fed into outlet pipe 26. Koizumi *et al.* '348 therefore provides no disclosure or suggestion of using a hollow fiber membrane moisturizer to humidify a purge gas that is supplied to a lithographic projection apparatus. Koizumi *et al.* '348 therefore does not disclose or suggest the features recited in independent claims 18, 24 and 44-47.

Thus, the combination of any of McElroy *et al.* '691, Cheng *et al.* '479, Kashkoush *et al.* '998 and Koizumi *et al.* '348 does not disclose or suggest independent claims 1, 7, 18, 24 and 44-47 because none of those references separately or in combination discloses or suggests use of a hollow fiber membrane moisturizer to create a humidified purge gas mixture that is supplied to at least part of a lithographic projection apparatus.

Applicants therefore submit that independent Claims 1, 7, 18, 24 and 44-47 are not disclosed or suggested by any of McElroy *et al.* '691, Cheng *et al.* '479, Kashkoush *et al.* '998 and Koizumi *et al.* '348, separately or in combination. Because the other rejected claims are dependent on the independent claims, they include their features and are therefore likewise not

disclosed or suggested for the same reasons. Applicants therefore request reconsideration and allowance of all claims.

*New Claims 91-104*

Regarding new Claims 91-104, Applicants submit that the cited references likewise do not disclose or suggest use of a membrane contactor to create a humidified purge gas mixture that is supplied to at least part of a lithographic projection apparatus.

**Supplemental Information Disclosure Statement**

An Supplemental Information Disclosure Statement (SIDS) is being filed concurrently herewith. Entry of the IDS is respectfully requested.

**CONCLUSION**

In view of the above amendments and remarks, it is believed that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned.

Respectfully submitted,

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